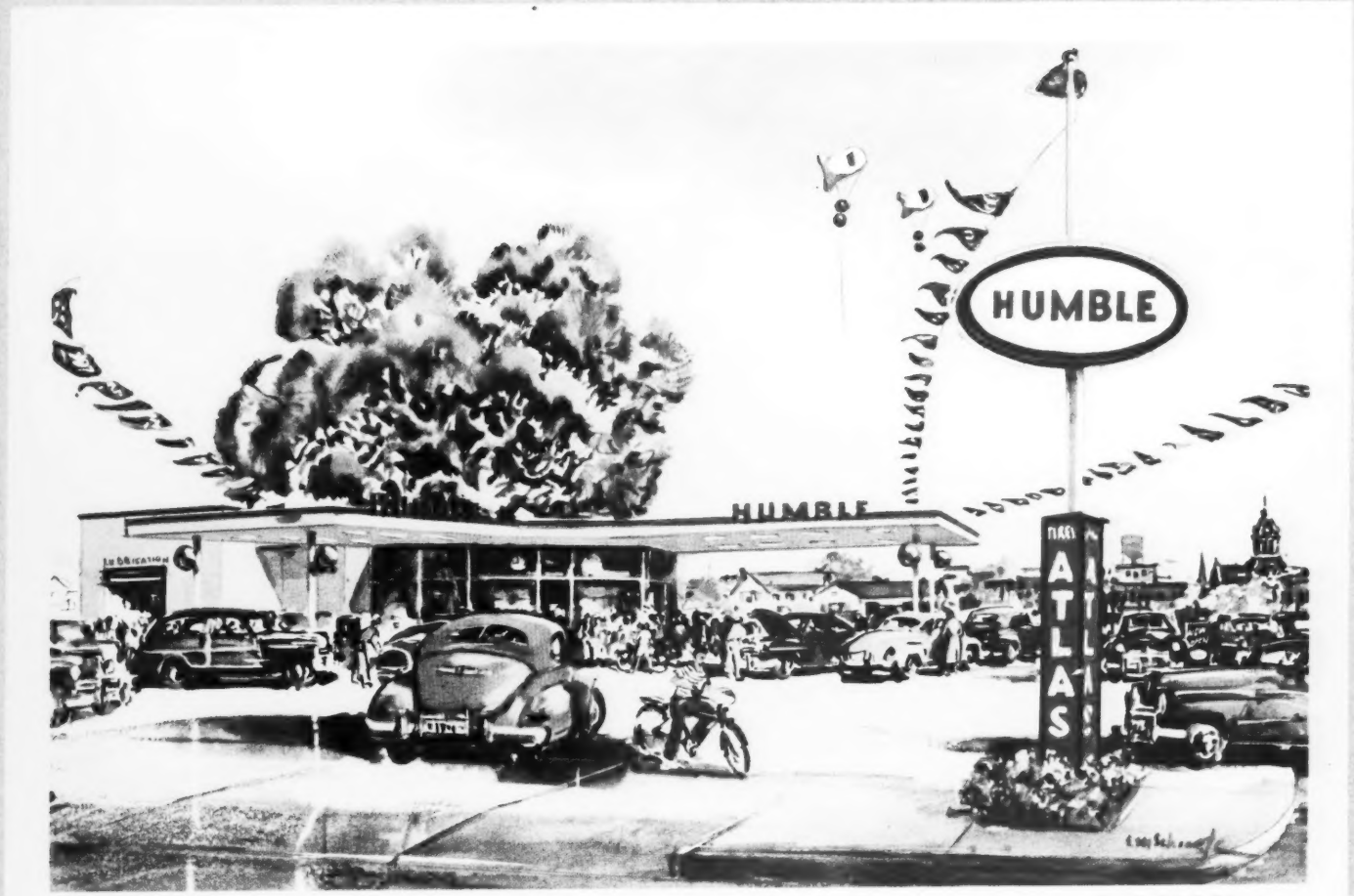


Opening Day — *By E. M. Schiwetz.*

The HUMBLE WAY

JULY-AUGUST, 1949

BAYTOWN REFINERY

The HUMBLE WAY

JULY-AUGUST, 1949
VOL. V NO. 2

Some people question whether gasoline marketers are really competing because most of them charge about the same price. "Oil for Middletown, U.S.A.," in the May-June issue, explained in general how consumers benefit from competition in every phase of the oil business. This article provides further information on the keen . . . . .

COMPETITION IN GASOLINE MARKETING

The average motorist probably drives his car about 30 miles a day. Whether he lives in a small community or a big city, he will pass a number of stations selling gasoline. They offer him a variety of brands and a range of quality and price. Each station would like to have his business regularly. He can stop as easily at one station as another, so where he buys will depend on product quality, service, and price. In case an appreciable difference in price persists between stations providing the same quality and service, he can easily buy from the one with the lowest price, and probably will. A dealer who tries to charge one cent a gallon more than nearby stations will find motorists passing by his place to stop at one across the street or down the block where they can save 10-15 cents each time they buy gasoline. In these circumstances, the customers' freedom of choice causes prices among the gasolines they consider of similar quality to be about the same. Consequently, the struggle among companies and stations for customers appears to be in terms of quality and service merely because motorists leave them little choice other than to sell at the competitive market level if they want to stay in business.

There exists a wide choice of gasoline brands, and also of stations selling the same brand, almost everywhere, especially in a large city. In Houston, for example, there are from 5 to 10 stations a mile along the main traffic routes. Along one typical section of 5 miles, 45 stations sell 9 well-known, widely-advertised brands and 5 other brands marketed locally, with an average of 4 stations marketing each of the well-known brands.

The fact that dealers identify their stations with well-known brands (because that helps to attract customers) creates the false impression that large companies own or control nearly all service stations. Actually, most stations are owned and operated by small businessmen who choose the line of products they will sell and do not hesitate to switch suppliers if it appears that they can make more money selling one product instead of another. By way of illustration, Humble alone was directly involved in changes by several hundred dealers in 1948; that is, some switched to Humble while others quit handling Humble's products to distribute instead the gasolines of competitors. Such changes take place often not only because large companies are competing for outlets and volume, but also because scores of small businessmen are competing with one another for the motorists' trade.

Each station usually has two grades of gasoline, regular and premium. That is only part of the choice in quality available; additional choice is offered by the different brands. Even the gasolines of large companies, which are generally considered to be very similar in quality, may differ in the same area by 5 per cent or more in octane rating, according to the reports published by the Bureau of Mines. The average motorist thinks that these differences cannot be detected in his car's performance, except that some brand may stand out above others for a time, but road performance tests show that such differences are substantial enough to be noticeable. There is a wide variation between the poorest and best quality gasolines on sale in a large city, frequently 15 per cent in terms of octane rating.

The price of gasoline really covers three distinct items; namely, the wholesale price for manufacturing and distributing the product, the dealer's retail mark-up, and

This unusual picture, taken where Baytown Refinery meets the sea at the Houston Ship Channel, tells a graphic story of oil transportation. Only trucks and pipe lines are not shown.

Wherever the motorist drives, in the big cities or small towns, he is offered a variety of brands of gasoline. He can stop as easily at one station as at another, so where he buys gasoline depends upon quality, price, and service.

state and federal taxes which average about 6 cents a gallon. The large companies selling brands that the public considers similar in quality of necessity must sell at about the same wholesale price in order to hold their dealers. The self-interest of dealers in buying at the same cost as their competitors exerts irresistible pressure on the large companies to sell at the same competitive wholesale price.

The margin of retail mark-up by dealers generally tends toward a uniform level because of competition, but the differences are sometimes greater than the public might think. A check of tickets sent in on credit sales by Humble dealers at Houston, Dallas, Fort Worth, and San Antonio for typical days this year showed that retail prices for the same grade differed by as much as 3½ cents a gallon, although Humble's wholesale price was the same at these points. But more than 90 per cent of the stations were charging 23 to 24 cents for regular gasoline and 25 to 26 cents for premium grade. Even these small differences cannot persist, unless the customers feel that they are justified by variations in the appearance of the station and quality of service. The pressure toward uniformity of price that exists between stations handling the same brand applies to all stations selling products of similar quality. Many purchasers are perfectly willing to switch brands and there is considerable shifting over a period of time from one to another.

For any product, the range of prices on one hand and quality and service on the other are closely related. In the case of gasoline, there is usually a 2 cent differential between regular and premium grades, and little-known brands marketed locally may sell for about 2 to 7 cents under the well-known brands. The price range in Houston at the end of July for all gasolines was from 17 to 26 cents a gallon, including taxes of 5½ cents. Motorists know that the average automobile will run on the cheapest gasoline being sold but they also realize, usually from experience, that inferior gasoline causes an engine to knock, form carbon, dilute the lubricating oil, and otherwise perform poorly. Most purchasers are interested

in good quality at a reasonable price rather than in the lowest price regardless of quality. If this were not so, stations offering the cheapest gasoline would quickly drive their competitors out of business, and each station would have to sell only one grade —the cheapest that could be made.

The demand for premium gasoline at a price 2 cents a gallon higher than that of regular grade available at adjacent pumps demonstrates the public's interest in buying high quality products if it considers the price reasonable. The premium price directly reflects differences in cost and quality. The cost is greater because of additional investment required in refining equipment and the extra operating expense involved in manufacturing and distribution. The better quality in octane and other specifications for premium gasoline permits superior car performance. Some automobile engines with high compression ratios require the premium grade, whereas others may not require it but do give much better performance with it, such as easier starting and faster pick-up. Many motorists buy the best grade gasoline because they have found out that the difference in quality is important and concluded that the product is well worth the small premium in price.

The gasoline marketing situation that confronts both sellers and buyers can be summarized briefly as follows: (1) Every motorist normally has access to numerous service stations conveniently located selling many competing brands of gasoline, and to several stations selling the same brand. (2) Products of different quality are available, ranging from inferior gasolines to the best of the well-known brands. (3) The motorist also has several choices in price: (a) between regular and premium gasoline at practically every station, (b) between dealers selling the same gasoline at slightly different prices, and (c) between stations offering widely different quality and price.

In these circumstances, the struggle among companies and stations for customers appears to be chiefly in terms of quality and service because competitive conditions leave little leeway for it to be in terms of price. Gasoline prices tend toward a uniform level as a result of competition, even though sellers would like very much to persuade motorists that their products or services are much better so that they could charge more than competitors.

Since customers are interested in the best product available at reasonable prices, oil companies have worked hard to improve quality as a means of attracting business. As a result, the octane rating of regular gasoline increased from an average of 50 in 1926 to about 75 in 1948, measured by the motor method prescribed by the American Society for Testing Materials. To make higher octane costs more money, and in addition the crude oil from which gasoline is refined now costs 40 per cent more than in 1926.

In spite of these factors increasing costs, the average national retail price of regular gasoline of 20.4 cents a gallon, excluding taxes, is one half cent less than in 1926.

The customer has thus been given the benefit of both better quality and lower price as a result of competition and technological progress. It is not likely that such vast improvements would have occurred in the absence of vigorous competition.

The practice of marketing two grades of gasoline, both of which are improved steadily in quality, provides the motorist with an opportunity to take advantage of progress by the petroleum industry either in terms of price or quality. Over a period of time, such improvements raise regular grade gasoline to the average level a few years earlier of premium gasoline. Regular grade gasoline at the end of such a period would give the same performance in an automobile as premium grade did at the beginning. It is clear in that case how the motorist can choose whether to take advantage of progress in terms of better quality or lower price. The progress has been so great since 1926 that motorists have gained in both respects. An important part of the benefit from better quality has been to permit the introduction of automobile engines which give much better performance without sacrifice of economy.

The public has the general impression that all gasoline prices rise or fall at the same time. Under the existing competitive circumstances, it is to be expected that the changes by different companies and dealers would occur within a short time. Whether any price change made by one company actually comes to prevail in the market depends upon its being a correct interpretation of existing market conditions. Sometimes it takes several weeks for the market to arrive at a new general level. An illustration of such an adjustment occurred in Texas in March, 1947. At that time Humble followed several competitors in raising the wholesale price of gasoline one cent a gallon, because of increased costs of raw materials. It was forced to reduce prices by one half cent a gallon approximately three weeks later back to the level posted by some other competitors, as Humble's higher price was arousing complaints from dealers handling the Company's products and was adversely affecting the Company's gasoline sales.

In an economy highly dependent upon automobile transportation, the price of gasoline is of interest to almost everyone. The market forces determining gasoline prices have not been generally appreciated or understood by the public. The facts have been so greatly misinterpreted that a substantial minority of the people believes that the tendency toward uniform prices brought about by keen competition is an indication of price conspiracy or monopoly. Analysis of gasoline marketing shows how competitive conditions inevitably tend to bring about relatively uniform prices for similar quality and service. That same competition is the explanation for the great improvement in product quality and the reasonable level of gasoline prices. Gasoline marketing is one of the most competitive retail businesses in the country, to the great benefit of the owners of about 40 million motor vehicles.

What Goes On Below

More Efficient production, better conservation result from increased study of oil reservoirs

As each day in 1949 passes, some 140 million Americans consume almost six million barrels of oil. In the last three years, oil consumption in the United States has totalled more than all the oil known in this country 30 years ago! In those 30 years we Americans have used five times the oil known—proved reserves—in 1919. We have used a lot of oil, yet today reserves of oil are the largest in history: roughly *23 billion barrels* in the United States, *70 billion barrels* in the world.

How can it be that we have used so much oil, and still have more than ever in reserve?

Probably the simplest answer is to say that we found more oil, and have found more ways to use it and to get more out of it. More oil has been found by drilling thousands of wells, from very shallow ones to those nearly three miles deep. Drilling equipment and tools have been greatly improved. Exploration methods have been improved, too, with the continuing improvement of the seismograph and the gravity meter, to keep the wildcatting average at one successful well in eight, even though the more easily found fields have been drilled. We get more out of oil today, too, including jet fuels, plastics, rubber, waxes, and many other new products.

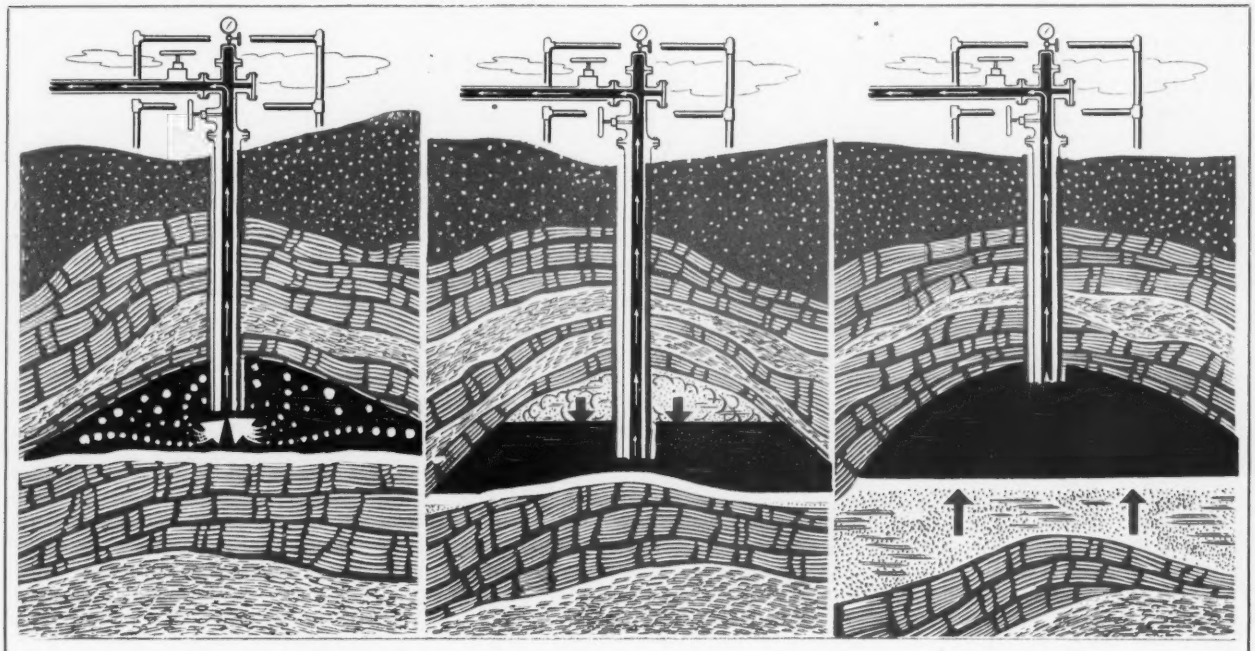
But the basic reason why we have found more oil and gas is that more is known about where oil comes from. Experienced oil men today have developed the knowledge of oil so that they can "see," figuratively, what goes on in an oil reservoir. Facts and theories developed and proven over many years by men in all parts of the industry—drillers, geologists, engineers, and others—have been pieced together to give a picture of oil in the earth and its natural movements. Knowing about oil's habits makes it possible to find and produce oil more efficiently.

In earlier days, when little was known of how oil was formed and how it reached the surface, gushers were proudly displayed as a measure of a well's strength. Flowing wells wide open wasted vast amounts of oil and gas by dissipating the reservoir energy, so that many millions of barrels of oil in those reservoirs may never be recovered. Today's improved production methods make possible greater recovery from a reservoir discovered this year than would have been possible if the discovery had been made 30 years ago. Likewise, many old fields have yielded more oil than was originally thought possible. As reservoir forces became better known, equipment and methods were improved, so that exploration, drilling, and production of oil are several times more efficient than 20 or 30 years ago.

Oil men have attempted to reconstruct the way that oil reservoirs were formed, and have determined that oil accumulates not in pools, but in the pore spaces of sandstone and limestone. According to the eminent geologist Wallace E. Pratt, oil reservoirs are most often found in marine rocks. These rocks were formed many millions of years ago as layers of sand, ooze and mud were deposited on the floors of ancient seas. In those days our world had a much different appearance, and some of these seas occupied what are now deserts. The deeply buried layers hardened into rock as the sediments accumulated, and the muds and clays became dense and impervious to fluids under pressure of the upper layers. Organic matter—marine life and plants—buried in the muds was then transformed into oil and gas and forced into the pore spaces of adjoining sands or other porous rock.

The oil and gas rose through the sea water in the pores of the sand layer until their upward movement was stopped at an impervious layer of rock such as shale. Then the oil and gas traveled further upward along the sand where it sloped up to a dome or arching structure or other barrier which prevented further upward migration, and there accumulated. Geologists have learned of many different kinds of "traps" where oil accumulates; some caused by faulting or shifting of the formation and others by "tight" sands where oil cannot flow. Gravity completed the development of a reservoir by segregating the gas, oil, and water into layers.

Oil men have learned, too, that oil does not fill all of the pore spaces in the reservoir sand. In earlier days it was thought that oil, as produced at the surface, occupied all of the pore volume, which is usually about 20 to 25 percent of the sand volume.



Dissolved Gas Drive | Gas Cap Drive | Water Drive

How Oil Wells Flow

The three major sources of energy by which oil is produced to the surface are shown here. In any particular reservoir, one of these sources usually provides the greater part of the energy although frequently all three may contribute to some extent. When a reservoir is discovered studies are immediately begun to determine the type and effectiveness of the drive or drives in operation, although often five to 15 per cent of the field may be produced before the final determination can be made. Note the importance of the depth at which a well is completed. In reservoirs where the drive is too weak to lift oil to the surface, artificial lift methods (gas lift, pumping, and others) are used.

Dissolved gas drive depends upon expansion of gas dissolved originally in the oil. As pressure declines gas is released from solution and forces the oil to the surface. This is the least efficient type of drive, maximum recovery usually being between 20 and 40 per cent of the oil in place.

In some instances it is possible to change the drive to a gas cap drive by "pressure maintenance"—injecting gas into the top of the reservoir to increase recovery. More than 50 per cent additional oil can often be gained by this means.

Free gas cap under pressure presses down on the oil and forces it to the surface under gas cap drive. This maintains pressure and retards gas escaping from solution. Recovery of 30 to 80 per cent of the oil in place may be achieved with this type of drive.

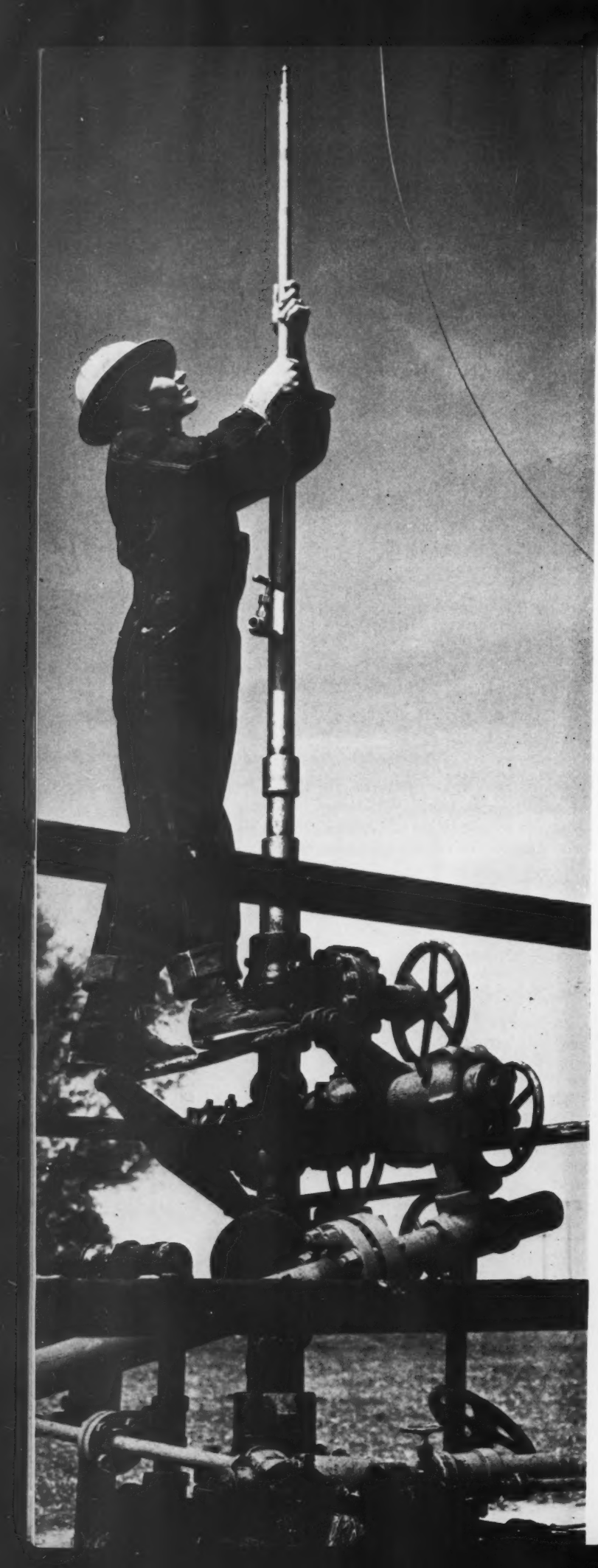
Most efficient gas cap reservoirs require uniform and highly permeable sands, effective segregation of oil and gas, restriction of free gas production, and decided structural relief. Maintenance of pressure is often aided by gas injection to increase the effectiveness of the gas cap.

Water advances from below to displace oil by water drive. This is the most efficient drive, as water flushes oil from sand more thoroughly than gas. Recovery is usually about 60 to 80 per cent of the oil in place.

Careful control of production is necessary to insure even advance of water and to avoid by-passing any oil. The East Texas field and many other large fields produce by water drive. In some places water produced with oil is injected back into the reservoir to maintain pressure and thereby to increase oil recovery.

It has been determined that gas, under the influence of the reservoir pressure, is dissolved in the oil in the reservoir. Also, quantities of salt water are in the oil sand which the oil and gas failed to force from tiny crevices as the ancient sea water was displaced. This "connate" or "interstitial" waters fills up about 10 to 40 percent of the pore volume of a sand. Thus we haven't as much oil as was thought originally in many cases. Yet, by knowing these things and the way reservoir fluids move through the rock, more oil can be recovered because the natural reservoir forces can be utilized to produce the maximum amount of oil ultimately.

We can see then, that the amount of oil in a reservoir sand might be only 15 percent of the sand volume. "Aver-



age" figures are misleading, as each sand and its fluids are different, even in various parts of the same reservoir, but it would not be unusual to find a reservoir fluid volume like this: Interstitial water, 20 percent, and "reservoir" oil, 80 percent. However, there is always some gas dissolved in the oil which comes out of solution as pressure declines. This might be 25 percent of the oil volume (10-30 percent is common), which would mean that oil as we know it in the stock tank would be only about 60 percent of the reservoir fluid. Since the pore space of the sand or rock is about 25 percent, the stock tank oil would only be about 60 percent of that, or 15 percent of the volume of the sand.

All Oil Cannot Be Recovered

But oil men cannot recover *all* of the oil in a sand. Under the very best conditions, it is very unusual to produce more than about 80 percent of the oil in place in a reservoir. This is because some oil, like the interstitial water, is trapped in tiny voids within the sand. Thus the maximum recoverable oil in a sand may be only about 12 percent of the sand volume. That's under the *best* conditions; these are not available in many fields.

Since oil possesses no energy in itself to drive itself to the well bore and climb hundreds or thousands of feet above its natural reservoir, recovery is a process of displacement. Compressed gas associated with or dissolved in the oil, or water compressed with the oil displaces the oil in the reservoir and forces it to the surface. (See the explanation of the three types of reservoir drive on page 5.) While water may be compressed only a small fraction of its volume, that amount may be sufficient to displace large quantities of oil because of the immense volumes of water involved. Water is often supplied from sources below the oil to provide the reservoir drive. Some gas, dissolved in or associated with the oil, is produced with the oil of each reservoir. This is commonly known as "casinghead gas."

These basic facts have evolved over many years, from

Bottomhole pressure surveys are made regularly with recording pressure gauge which is lowered into well on wire line.

research work, field experiences, laboratory experiments, and many other sources. Gradually, from this knowledge, the science and technology of *reservoir engineering* has emerged. This relatively new phase of engineering centers primarily on studying and planning oil production.

The need for accurate estimation of reserves and application of scientific production practices was recognized many years ago by Humble's management, and more than 20 years ago a research section was set up to investigate reservoir principles. This group began work with rather meager scientific information, and has been one of the leading groups which have contributed to the knowledge of oil reservoirs today. The research has proven its worth in showing the way to greater oil recovery.

As more was learned of reservoirs and drives and production, the information was used by engineers who had worked in the research. Gradually, as reservoir principles became more clearly defined, the need for widespread application of them brought more engineers into reservoir work. The growth continued, and about five years ago the company began an enlarged training program for petroleum engineers. So far, 51 petroleum engineers have taken the intensive 90-day course in reservoir principles and operation. Today the broad direction of the methods by which Humble's oil reservoirs are produced is exercised by the reservoir engineers in the Production Practices group of the Petroleum Engineering Division. Research and specialized study continue to be carried on by the Production Research Division.

Humble's management of oil production is based on detailed reservoir information in each field. With production in more than 300 fields, making detailed studies for every reservoir simultaneously would be a monumental task. Preliminary studies, made on each reservoir as production is established, guide operation until a detailed study can be made. So far, detailed studies have been completed on a number of the larger fields and smaller ones where performance indicated that a detailed study was urgently necessary. Still closer study on all fields will be achieved as more engineers are trained in reservoir operations.

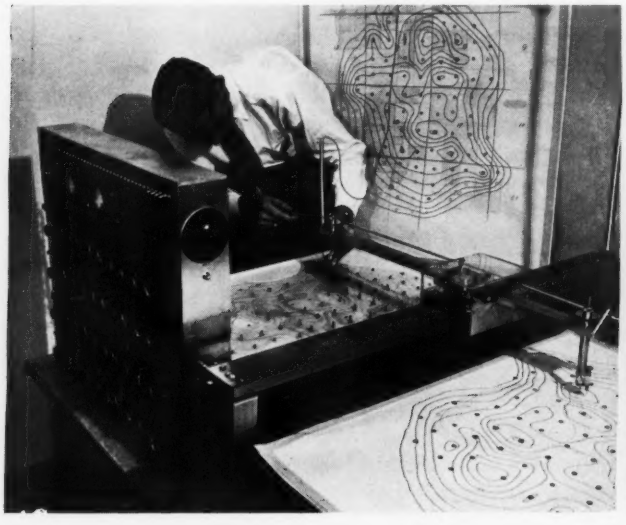
These reservoir analyses are primarily inventories of present and past practices which provide the basis of estimating future conditions and determining operating plans. The information is useful in many ways: for determining maximum efficient rates of production, estimating reserves, determining the possibility of loss, analyzing pressure maintenance and secondary recovery methods, and planning workover and artificial lift programs. In short, reservoir studies provide a firm basis of information for obtaining the maximum ultimate oil recovery from a reservoir.

Data Collected in Many Ways

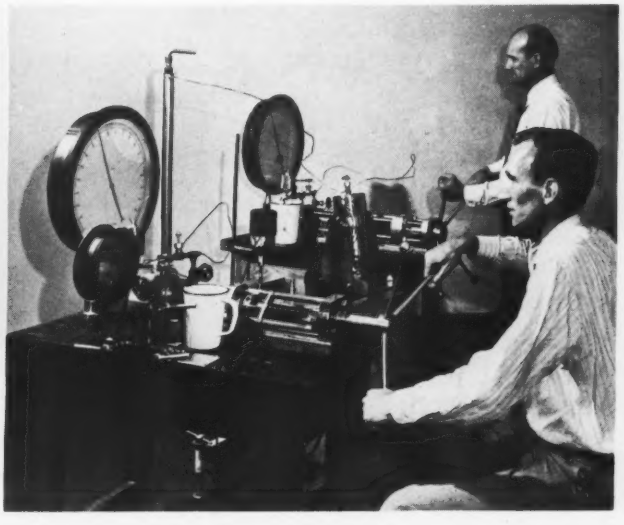
Quite naturally, the geologic picture of the reservoir forms the foundation of a reservoir study. From the seismograph or other geophysical surveys, from geological subsurface maps, and from cores and electric logs of wells drilled, the picture of the reservoir is pieced together. As the wells are drilled in a field, the depth and thickness and area of the oil sand are recorded and correlated to "reconstruct" the reservoir structure. The general area of the reservoir is defined by dry holes on the flanks of the producing sand.

The porosity of the sand (how much of a sand is pore space), the permeability (how easily do oil, gas, and water move through the sand pores), and the oil and interstitial water content in the sand pores may be learned from cores taken during drilling. Electric logs supply information such as the depth and thickness of sands, and also their continuity. From drill-stem tests the areas of gas-oil contact and oil-water contact are determined, in addition to the bottomhole pressure and temperature.

Engineer adjusts field model used to compute flow of reservoir fluids in determining best production rates.



Careful tests are made of samples of reservoir fluids and cores; here test is made on oil saturation of a sand.



Core samples taken during drilling supply information for field geologist, core analyst, and reservoir engineer.

With all of these facts in hand, the picture of the reservoir can be fairly well completed.

But the nature of the reservoir fluids has an important effect upon the way in which the oil and gas are produced. As quickly as possible after a reservoir is discovered a subsurface sample is taken, retaining the sample under its reservoir pressure as it is brought to the surface. The sample is analyzed to determine the composition of the oil and gas, and their expansibility, gravity, and viscosity. Especially important is the saturation pressure and amount of dissolved gas in the oil under reservoir conditions. From the data thus assembled the behavior of the reservoir under the three possible types of producing mechanisms can be calculated.

Continuous data, taken at frequent intervals, completes the information required for a detailed reservoir study. Bottomhole pressure and the production of each well—oil, gas, and water—must be recorded regularly. The development history and production figures are needed for older fields to assess previous production practices. Pumpers on each lease maintain daily reports of production, and bottomhole pressures are taken frequently. A bottomhole pressure survey of a field is usually made about every six months.

All the physical and historical data of the reservoir and its fluids must be recorded meticulously as time goes on, in order to provide the reservoir engineer with the necessary information to study the reservoir. For a medium-sized field, it may require several engineers up to six months to complete a study, with much of the time spent in assembling and studying the data. Fluid-flow equations for reservoirs, with so many variables, are particularly long and complicated. Some assistance in making calculations can be obtained from an electronic oil reservoir analyzer. The analyzer solves long complicated problems in a fraction of the time required for their mathematical computation. One feature of its use is that it can compress 10 years of time into five minutes in predicting future behavior of a reservoir.

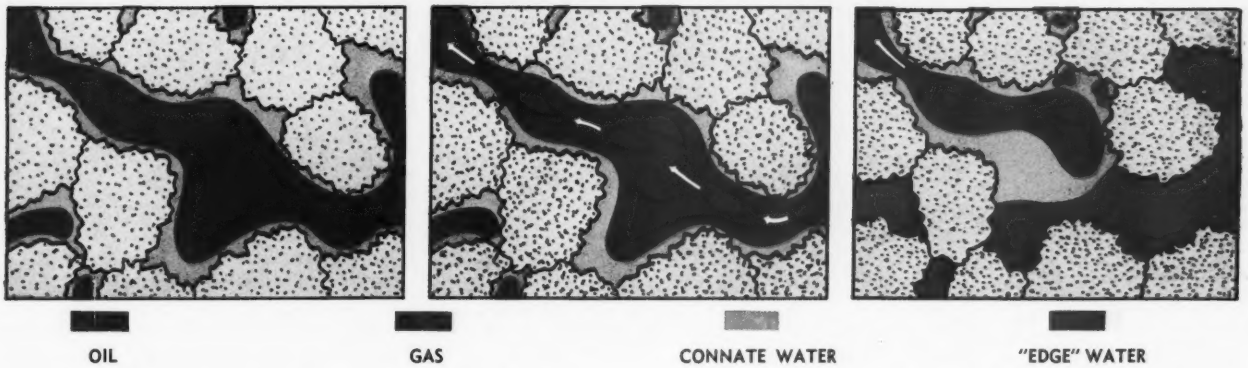
When a reservoir study is complete, it forms the basis of operation for the reservoir. Fluid production is set, and workovers and artificial lift are planned in advance. Efficient reservoir practices are essentially achieved by using a displacement drive (gas cap or water) instead of dissolved gas drive, and by avoiding the dissipation of reservoir forces which expel the oil. Careful control of the rate of production is the key to utilizing gas cap or water drive; efficient practice also requires control of gas and water production.

Reservoir studies are used in determining the maximum efficient rate of production of a reservoir. As the knowledge of reservoirs advanced, it became obvious that the reservoir drive might be impaired or reduced in its efficiency if the oil were produced too fast. Maximum efficient rates (MERs) were calculated for each reservoir, then, which set the limit of efficient production.

With the rapid increase in demand to supply World War II's needs, concern was felt by some that damage to oil fields might be caused by excessive production. The MERs determined by the industry allayed that concern and set the pattern for oil production during and since the war. That the MERs are sound conservation practice is proven today, for the condition of the oil reservoirs is relatively unchanged but for the large amounts of oil produced at maximum efficient rates to supply war needs and the greater needs of the public since the war.

The present knowledge of oil reservoirs and their characteristics supplies engineers in the oil industry with broad principles for the efficient production of oil and gas. It also provides oil scientists with the foundation for more extensive research into problems of oil recovery. Throughout the industry men are at work seeking to further improve production methods, and as more is learned about oil reservoirs, better methods may be developed to recover more oil. That's good business—and good conservation. That's insurance of oil for your future needs.

Research engineer operates reservoir analyzer which electronically computes oil flow and reservoir behavior.



How oil moves through sand is shown in this typical example of movement where oil is produced by water drive. Oil and salt water lie in pores of rock (shown highly magnified) before oil is produced (left). As oil is withdrawn, gas expands and comes out of solution as pressure declines, and rushes into well, pushing oil with it (center). (Right) Later, "edge" water rising from below flushes most of oil from sand, though at best about 20 percent remains.

Gala atmosphere which accompanies openings of new service stations is planned to announce to motorists passing by that Humble has moved into the neighborhood, has something worthwhile to offer, and wants to be a good neighbor.

Progress in Marketing

Sustained upward trend in Sales volume based on quality products, trained personnel, promotion, modern distribution system

IT WAS a usual May Saturday in Dallas this year . . . cool, a few scattered clouds, with a brisk breeze blowing.

But anyone in the neighborhood could see that something unusual was going on at the corner of Lover's Lane and Devonshire Street. There, above a brand-new Humble service station, banners fluttered in the breeze and a big balloon, hovering fifty feet in the air, attracted passing motorists. The driveway teemed with activity, and cars were lined up almost bumper-to-bumper a half block down the street, waiting to be served. If they could have paused a moment in their tasks, any of the neatly uniformed salesmen could have told the curious passersby, "This is a typical Humble service station opening."

Planning, showmanship, and a lot of hard work went into the opening of that station. But beneath the surface, there was more than that. For this was no "one day stand." This was a way of telling people that Humble had moved into the neighborhood,

wanted to be a good neighbor, and had something worthwhile to offer.

The formal opening of this one new station typifies in itself what has been happening in Humble's sales department these four years past. Openings just such as this, multiplied many times in many communities, have been important among the factors that have contributed to Humble's advancement since 1945 from fifth place to second place as a gasoline marketer in Texas. The story behind that steady rise is a story of quality products; a story of courtesy and service—and station cleanliness; a story of continuous training—a story of aggressive salesmanship and teamwork. The sustained upward trend of Humble sales since V-J Day didn't just happen; it was *planned* that way.

On V-J Day, the Humble Company was ready to change Baytown refinery from wartime to peacetime production. Shifting from the production of high octane aviation gasoline and other petroleum products for war, Humble began almost at once to refine motor gasoline of a quality never before available to Texas motorists. Baytown's superb facilities—both those built during and before the war—combined with its wide selection and adequate supply of crude oils, made possible the immediate manufacture of the first great postwar motor fuel.

The gasoline thus refined was Esso Extra. This high octane product immediately captured the favor of Texas motorists, who had been obliged to be content with lower quality motor fuels during the war.

The manufacture of this product, however, was only part of the story. In the petroleum industry, "building a better mousetrap" is not enough. Esso Extra had to be economically transported from Baytown to stations

The Cover

In the busy scene on the cover, Artist E. M. Schiwetz portrays in bright colors the formal opening of a new Humble service station.

Personnel training is aimed at these goals: to give driveway salesmen a broad knowledge of products and service, and to make them appreciate their obligations to Texas motorists and other stations under the Humble sign.

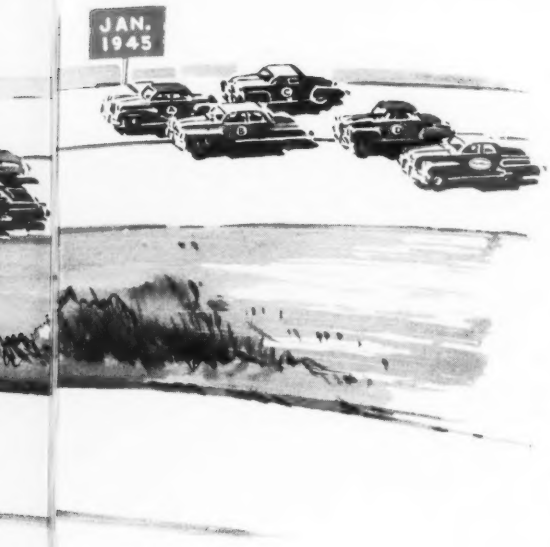
Humble Climbs From Fifth to Second In Texas Gasoline Sales in Three Years

all over the state; and even while problems of manufacturing and distribution were being solved, Texans had to be told that a high quality gasoline was being sold in Humble stations everywhere, and they had to be given service of the same high quality. Along with the introduction of a postwar gasoline that won prompt public favor, Humble gave high priority to the improvement of the quality of service at its stations.

A training program for retail sales people was drawn up, led off by a film dramatically introducing Esso Extra gasoline. Following close on this series of meetings were similar gatherings at which Humble 8-Step Service and the principles of good housekeeping were presented in films and on-the-spot demonstrations. Humble dealers and their salesmen took away from these meetings more than product knowledge and service technique. They went away with a feeling of oneness, an "esprit de corps," and an understanding of the plan with which Humble was soon to rise from fifth to second place among Texas petroleum marketers. The personnel of each station was given a feeling of their station's individual importance in the overall campaign for cleaner stations with better service —of their obligations to Texas motorists and to other retail outlets selling Humble products. This training program still continues on a regular schedule. By August of this year, Humble's retail training meetings, begun in 1945, had attracted a total attendance of 200,124 at 5,069 meetings designed to help them know more about efficient service station operation.

This widespread program has not been the only way in which quality of service at Humble stations has been improved. Training stations for schooling prospective Humble service station managers and dealers were begun in 1946. Located at key points throughout the state, these training stations furnish a steady flow of men who are thoroughly trained in both the know-how and spirit of service. With a long period of well planned instruction under actual driveway conditions, qualified men learn thoroughly the story of Humble products and how they perform in a customer's car. But most of all, they learn that each manager prospers as he lives up to the name of his business—a "service station." Many of the new Humble stations are managed by graduates of these training stations, and driveway salesmen in new stations are always given basic training in service prior to the stations' openings.

To implement the program of growth, Sales Department personnel was expanded as rapidly as men could be developed. Young men who entered the organization found themselves in the position of the teacher who reads ahead of the students—they were in training while setting one of the most impressive sales records in the postwar petroleum industry. With all this growth came a gradual decentraliza-



tion of management. On January 1, 1949, the four former Sales *districts* in the state became Sales *divisions*, and each division was divided into four districts. Sixteen district managers direct marketing operations in these smaller, more compact units.

While Humble sales have increased materially in all four divisions, the greatest strides have been made in the Northeast Texas Division, much of which is newly opened territory. The number of retail outlets selling Humble products in that division have increased in number by more than 350 and retail gasoline sales have tripled in the short span of two years. Much of this gallonage comes from new stations in territory long served by Humble in a modest way, the metropolitan areas of Fort Worth and Dallas. But a large part of this increase is a result of Humble's expanding its distribution system to the towns and cities situated south of the Red River, between Dallas and the borders of Oklahoma, Arkansas, and the upper part of Louisiana.

The basis of this improved distribution system is the 276-mile products pipe line from Baytown refinery to the Irving terminal between Fort Worth and Dallas. Along the route, strategically situated, other terminals are operated at Houston, Waco, and Hearne.

From these terminals, Humble transport trucks and those of common carrier lines move the products to the tanks of bulk and service stations over a wide area. Enough gasoline to fill the tanks of 38,750 automobiles pours from the storage tanks of the terminals daily into the compartments of these transports.

Such a simple explanation, however, does not do justice to the tremendous task of balancing out all factors that enter into this delivery problem—storage capacity at the terminals, the amount of storage available at each station, the rapidity of sales at the stations, and the scheduling of truck deliveries. All these operations elements must function smoothly together.

The men in the sales operations group, set up to solve the many problems that arise, are tackling a tough job, but they are fitted for the task. Most of them can roll a barrel down a warehouse ramp or maneuver a slide rule with equal facility. Every distribution factor that has proved a thorny problem is a target for them. Besides improving gasoline deliveries, equal energy and intelligence are applied to speed the movement and reduce to a minimum the handling of packaged goods, tires, canned motor oil, and the many accessory items needed at Humble stations.

But not only is delivery to Humble stations coming in for careful study; fast and efficient service to commercial and consumer accounts under the varying conditions which exist in widely separated local areas poses problems that call for specialized equipment and expert planning. So also does serving the farm and ranch trade, and the operations group is anxious to assist bulk agents in offering the best of service to the state's increasing number of mechanized farms and ranches.

Efficient delivery equipment is not the complete answer to operations problems. To bring about intelligent use of the proper equipment, a program is now under way to give thorough and efficient training in all phases of sales operations. At these training sessions truck salesmen, bulk plant superintendents, and warehouse clerks sit down together and discuss mutual problems. From these discussions is coming a new awareness of the importance of improved and more economical operations. For example, at such a gathering in East Texas, an old-time bulk plant employee was leaving the meeting with a young truck salesman. "You know," said the young man to his older associate, "this must be old stuff to you, but I never realized that so much planning went into a simple gasoline delivery."

The older man smiled sheepishly,

Training meetings serve to train salesmen and build a oneness of spirit.

Promotion and merchandising program generates interest, helps sales progress.

"Funny thing, I didn't know it either; but I'm sure learning fast."

That's the way all Humble salesmen feel; they are learning it fast. And they realize that there is more to an expansion program than the mere delivery of a high quality product through a pipe line. This product must be sold through stations that are attractive and clean, and personnel in these stations must be trained and ready to give quality service. Even then, the job is not complete, for the old advertising maxim of "repeat and repeat" also applies to the service station business. Texas motorists must still be told again and again of these advantages by means of radio, outdoor posters, newspapers, and service station sales promotion efforts. Outstanding of course in the advertising program is Humble's sponsorship of Southwest Conference football broadcasts. This year marks the sixteenth consecutive season that this popular activity has brought its powerful listener appeal to the support of Humble's merchandising programs.

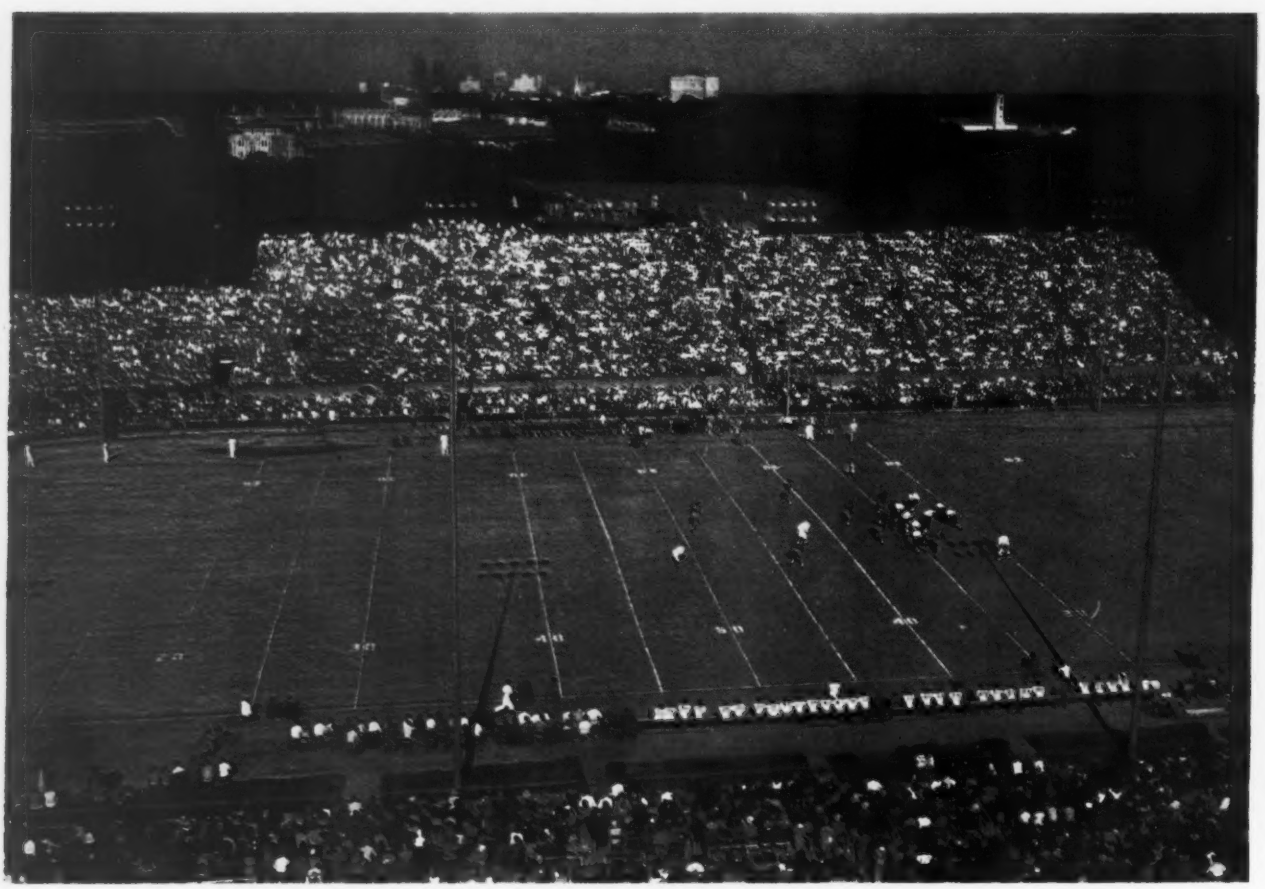
So, four years after V-J Day, Humble's Sales Department can look back on a period of growth that has seen its personnel expand from 550 to more than 1,200; 46 new bulk stations have been built to help service the 1,200 retail outlets that started buying and selling Humble products during this period. Sales volume in both the new and old stations has shown a constant upward trend. Independent dealer stations buying Humble products have doubled their average monthly sales, while commission operated stations have nearly tripled the average number of gallons sold through their pumps.

Of course, all Humble sales people feel good about this increase in business, but a line from one lady's letter to Sales Manager Frank Watts probably tells better than gallonage figures what everyone is working toward:

"I found your station at Lover's Lane and Devonshire Street a very nice place to stop."

That's the way Humble salesmen like to feel that Texans look on the growth of their Sales Department—that more and more of them are finding Humble stations "a very nice place to stop."

Humble's sponsorship of Southwest Conference football broadcasts brings this powerful listener appeal to the support of various other merchandising programs. This year marks sixteenth consecutive season for this program.



Rig 30 Adds a "SIDETRACKER"

Time, effort saved on round trips

Traveling block, "sidetracked," descends beside stand of drill pipe in center of derrick. Block is pulled over to carriage which rides special rail (right, below).

REGULAR visitors and members of the drilling crew have grown accustomed to new and unusual things on Humble's Rig 30 in the Sugar Valley field between Bay City and West Columbia. It is *"the automatic rig,"* and people are forewarned as they approach it that drill pipe and drilling are handled in a different way there. But few are prepared for seeing the nine-ton traveling block moving up and down along the *side* of the derrick.

This newest addition of easy-to-work time-saving equipment is a "sidetrack" and power elevators for handling the traveling block and drill pipe during round trips to change bits or make well surveys. They remove the last real exertion for the drilling crew from the task of making round trips, and at the same time save about one-fourth of the time required for round trips. The new equipment is designed for use with the remote control power tongs and pipe racker which have been in operation on Rig 30 for about a year. (See THE HUMBLE WAY, July-August, 1948.)

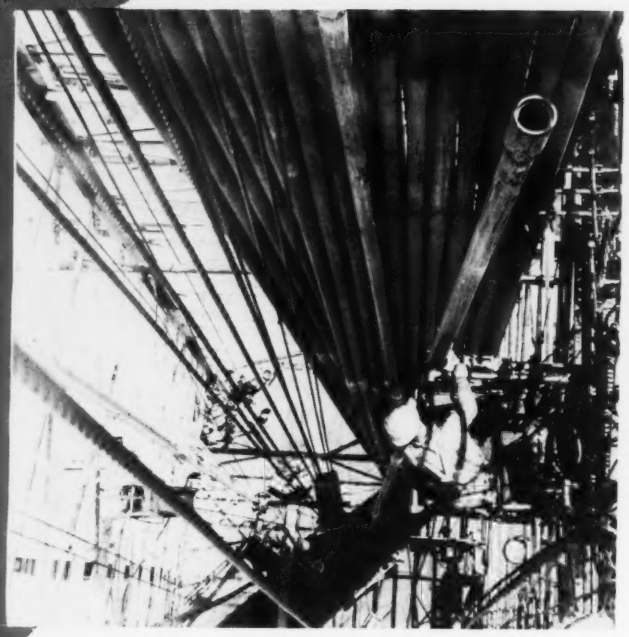
Essentially the "sidetracker" is a device which makes possible moving the block up and down during the time the 90-foot-long stands of drill pipe are being "made up" or "broken out"—screwed up or unscrewed—by the power tongs and racked in the derrick. The block is thus used only for hoisting and lowering the entire drill pipe string, and is kept in motion almost continuously. Previously, and on conventional rigs, single stands were hoisted to and from the racked position, and the block was motionless during the make-up and break-out periods. Now this "motionless" time has been saved.

Preliminary tests have shown that where the average time for pulling a stand was 60 seconds by conventional methods, the time using the sidetracker and remote control tongs was 45 seconds in the same gear. This may be reduced further as the crews become more familiar with its operation.

By keeping the block moving almost continuously, the drilling crewmen find that they can do the work faster, yet more leisurely and easily. There are no peak work periods followed by a rest, but rather an easy, continuous cycle of operation. The equipment is not at all complicated, and is simple to operate.

The sidetrack and power elevators recently added to the remote control and automatic equipment on Rig 30 are further steps in the development of advanced drilling equipment. When finally developed, the new equipment will not only make drilling less costly, but will enable men of long experience to continue to apply their knowledge and skill to drilling for more oil.

(For details of operation, turn the page.)

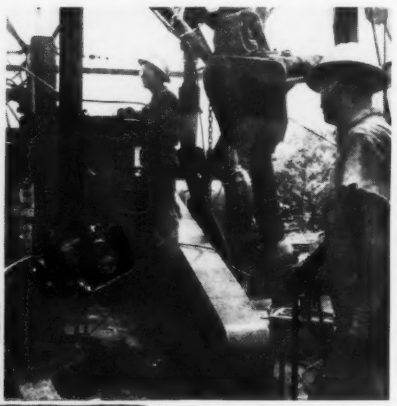


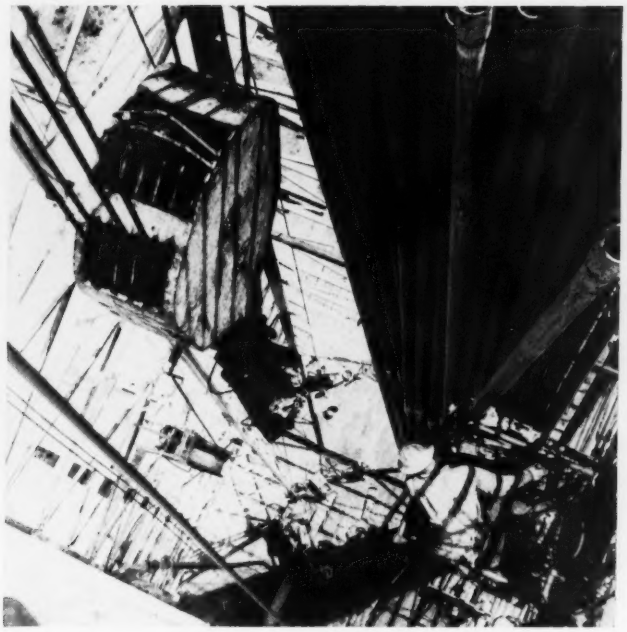
1 Derrickman looks down as lower racking arm "hands" stand to power tongs and block begins to ascend.

OF THE time required for drilling a well, about 13 percent is consumed pulling the drill pipe out of the hole and running it back in with a new bit. The new "sidetracker" and power equipment on Rig 30 make possible considerable savings in drilling costs by reducing round trip time by one-fourth. On a 10,000 foot well in the Gulf Coast area, the savings would average about 2½ days, at about $1,500 a day.

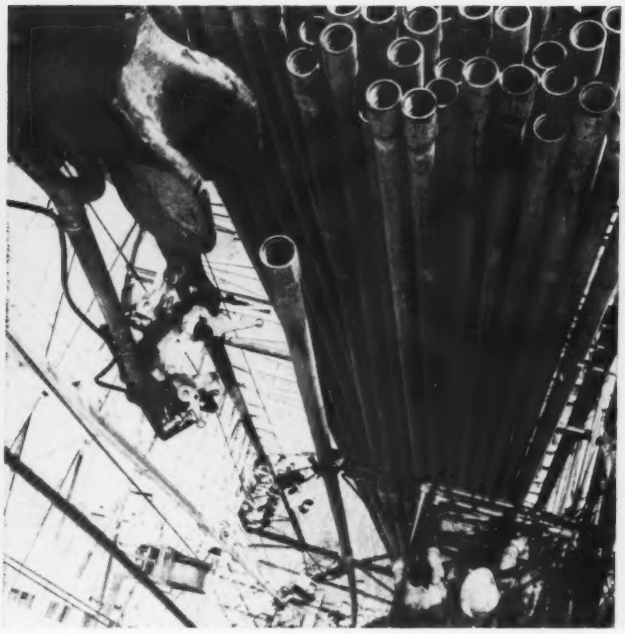
Clean, abundant compressed air does the muscle work in deflecting the traveling block and operating the elevators on Rig 30. A large air actuating cylinder mounted on the derrick deflects the block by means of small wire lines from a carriage on the special derrick rail. Counter-tensioning keeps the block at a uniform three feet off center as high as the monkey board, above which the block approaches the center of the derrick.

4 Rotary helper (right) trips valves to release elevators and deflect block. (Pos. 1 in drawing at left.)





2 Traveling block passes derrickman watching tong movement on floor to coordinate upper arm action.



3 Block above, derrickman moves stand out with racking arm to catch ascending elevators as tongs "makeup."

Briefly, the remote-control equipment is operated in this way during a round trip:

Going in the hole (returning the pipe to the hole) the traveling block is deflected on its upward trip as each 90-foot stand is lifted from the elevated pipe rack on the derrick floor. (Position 1 on drawing at left.) As the upper racking arm controlled by the derrickman grips the upper end of the stand, the tong operator controls lower racking arm and power tongs in moving the lower end of the stand to screw it into the drill pipe in the rotary (Pictures 4-7). By the time the stand is "made up," the block and stand are in the dotted positions at (3) in the drawing at left, and the derrickman pushes the stand into the automatically latching elevators with the racking arm. As the block continues to the top of the derrick and picks up the entire string of drill pipe, the driller frees the grip of the power slips on the pipe in the hole by his control valve, and lowers the entire string of pipe into the hole. When the top of the stand gets to the proper height above the rotary, the driller "sets" the slips, and the cycle is repeated. Time: about 45 seconds.

Coming out of the hole, virtually the reverse procedure is used. As the stand is pulled up into the derrick and the slips are set, the derrickman moves the upper racking arm to grip the top of the stand. The rotary helper on the derrick floor trips the elevator release valve and the deflector valve, which "sidetrack" the block as it is lowered by the driller's control. The stand is broken out and racked using the power tongs and racking arms.

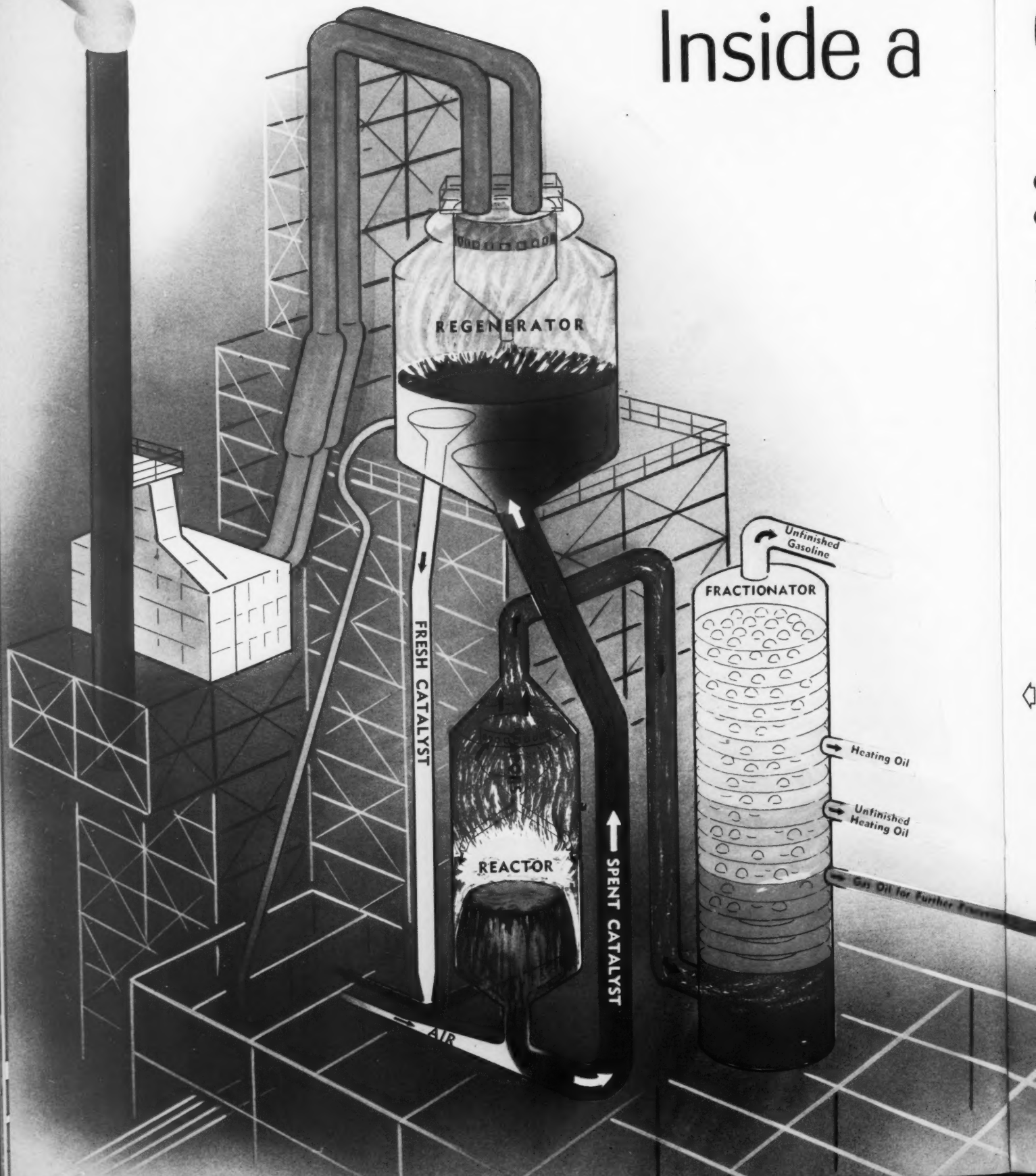
Continuing development of the equipment is being carried on by Humble's Petroleum Engineering division, equipment consultants, and a leading equipment manufacturer.

5 Elevators (center) move back as tong operator coordinates stand movement with derrickman above.

6 Elevators, still rising, move aside as tong operator moves stand (left) to pipe in rotary to screw it up.

7 Rotary helper moves valves to release deflector, elevators at top of derrick as tongs make connection.

Inside a


REGENERATOR
FRESH CATALYST
REACTOR
SPENT CATALYST
AIR
FRACTIONATOR
Unfinished Gasoline
Heating Oil
Unfinished Heating Oil

CAT CRACKER

Cat Crackers Make Extra Aviation Gasolines and High Quality Esso Extra

On these pages is a 20-story giant with a 40,000 barrel per day appetite. Each day Baytown Refinery's Cat Cracker No. 2 produces more than 600,000 gallons of gasoline components which are manufactured into 100-plus octane aviation gasoline, Humble Esso Extra, Humble Motor Fuel, and other products. The ease and efficiency with which Baytown's two cat crackers get more "squeal out of the pig"—the pig being crude oil in this case—makes possible the marketing of Humble's superior quality Esso Extra gasoline at competitive prices.

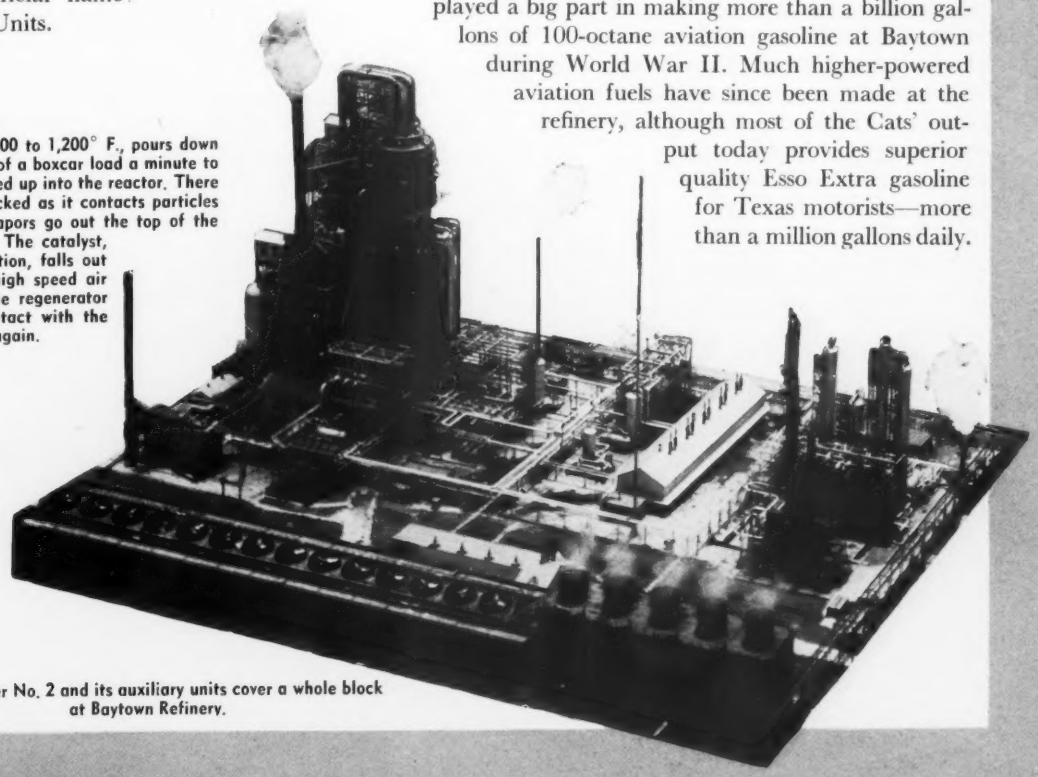
A cascade of catalyst so finely ground that it moves and feels like a liquid circulates at a rate of *35 tons per minute* to transform gas-oil (somewhat heavier than kerosene) into high quality gasolines and heating oils. This reaction, in which the powdery catalyst "picks up" carbon atoms from hydrocarbon molecules, gives the giant "cats" their official name: Fluid Catalytic Cracking Units.

Crude oil first goes to the stills in the refinery, where the lighter fractions are distilled off. Some of these are called "naphthas" in the refinery, until they are processed and blended to make various grades of aviation and motor gasolines and other light products. The next heavier "cut"—a gas oil, only slightly heavier than kerosene—is fed into the cat crackers where the reaction produces more heating oil, gasoline, and lighter fractions.

The cat units produce propane, butane, and pentane fractions containing olefins which are alkylated and blended into aviation gasolines and processed for inclusion in Esso Extra and Humble motor fuel. The olefins in the butane fraction are also used for making synthetic rubber. The next "cuts" are a high grade heating oil, used extensively in Northern and Eastern states, and an unfinished heating oil which is treated and rerun to be finished. The remaining heavy gas-oil is thermally cracked under high temperatures and pressures to make more gasoline, heating and fuel oils.

Both Cat Cracker No. 1, which was completed in November, 1942, and No. 2, completed in February, 1944, played a big part in making more than a billion gallons of 100-octane aviation gasoline at Baytown during World War II. Much higher-powered aviation fuels have since been made at the refinery, although most of the Cats' output today provides superior quality Esso Extra gasoline for Texas motorists—more than a million gallons daily.

Clean white catalyst powder, at 1,000 to 1,200° F., pours down standpipe from regenerator at rate of a boxcar load a minute to mix with vaporized oil and be churned up into the reactor. There every molecule of the vapors is cracked as it contacts particles of the catalyst, and the cracked vapors go out the top of the reactor to the fractionating tower. The catalyst, blackened with carbon in the reaction, falls out the bottom of the reactor into a high speed air stream which carries it back to the regenerator where the carbon burns off in contact with the air and it is ready for use again.



Cat Cracker No. 2 and its auxiliary units cover a whole block at Baytown Refinery.

Pipeliner Spends

A Day in the Houston

R. V. Hanrahan, president of Humble Pipe Line Company, extends official welcome to C. W. Fowler, left, on his visit to the Houston Office; later he was host at a luncheon, attended by other Pipe Line officials, where Fowler was honor guest.

"IT'S interesting to see how many people with so many different skills are needed to direct the overall job of getting oil from the ground, making it into finished products, then putting those products into the hands of the people who use them."

Talking was C. W. Fowler, a quiet-spoken veteran of almost 30 years with Humble Pipe Line Company. As a guest of THE HUMBLE WAY, he had spent a busy day in the Houston office where he had visited key departments, large and small. In his summary he was trying to see how his job as operating chief engineer at Childress pump station, up in the Texas Panhandle, ties in with the work of about 3,000 Humble employees in Houston; with 19,000 in all the various phases of operations.

"There's a lot of work going on here," Fowler observed. "But the way everyone works together, like one big family, makes the job look easy."

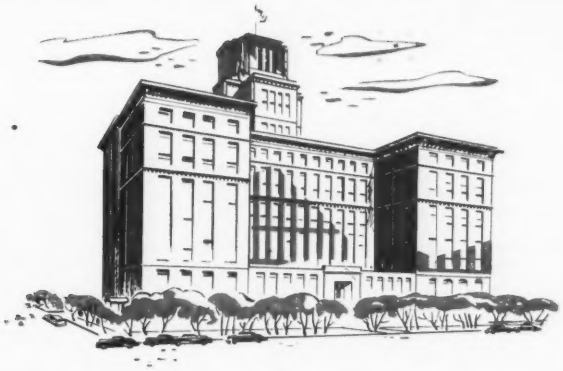
He meant, for example, that there are only five people at Childress pump station; in the Houston office Sales Accounting Department alone there are 264, each doing a necessary job. And, although pipe line operations depend heavily upon good communications, the telephone calls at Childress pump station seem few in comparison with the average of 2,000 calls handled hourly by Houston office telephone operators.

Fowler's visit to the Pipe Line Dispatcher's office was enjoyable, of course, for it is with this group of employes that he works most closely, and many of them are friends of long standing. The Dispatcher's office directs oil movements through all 190 pump stations in Humble Pipe Line Company's system; maintains hourly contact with each station to determine pumping overages and shortages; and advises when to expect deliveries or to pump oil to other stations.

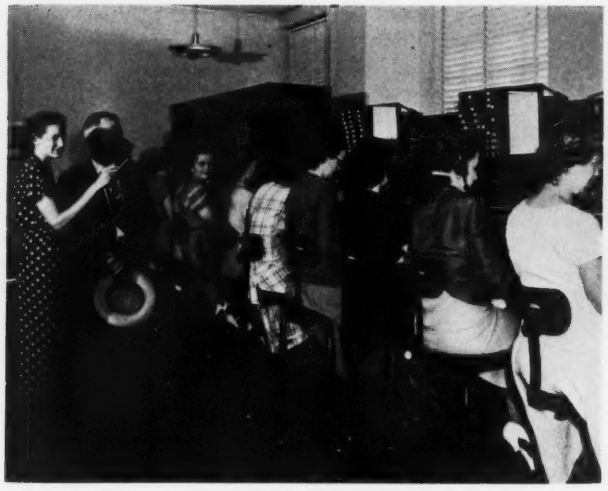
He felt right at home also when he saw the modern equipment that produces power for the Humble Building and the warm and cold air for weather conditioning. While inspecting this maze of machinery in the basement he began to reminisce, talking of earlier days when power came from steam engines rather than from diesel and electric units, and when joints of line pipe were screwed together, not welded as they are today.

(Turn to Page 22)

Office



C. W. Fowler of Childress Pump Station, a Pipeliner with 30 Years' Service, Visits the Houston Office.



Supervisor Jewel Raney explains how busy Humble telephone operators handle an average of 2,000 calls every hour.

The Polk Avenue entrance has replaced the courtyard that Fowler remembered from his last Houston visit in 1940.

Mrs. Kathryn Seixas explains receptionist's duties to the visiting pipeliner. Pneumatic mail tubes in the background.

Ney Sessums shows Fowler the machine that makes up his pay check and those of other Pipe Line personnel in the field.

R. E. Brewer, Assistant Chief Sales Accountant, briefs Fowler on work done by people in Sales Accounting Department.

M. H. Pittman, Dispatcher's Office Superintendent, left, started with Company as field telegrapher under Fowler. Wire Chief C. T. Bolleter at right; teletype operators in fore.

L. B. Gunn shouts above the roar of one of the several air conditioning fans in the Building basement. Fowler said later, "It was like a West Texas sandstorm without sand."

O. Q. Lomax, Vice President and General Superintendent of Humble Pipe Line Company, holds hat as Assistant Secretary C. C. Moore watches and Marjorie Pepper draws Fowler's name. 20-year pipeliners in Panhandle were eligible for trip.

C. W. Fowler Has Interesting Trip Around Houston Office

(Continued from Page 20)

"I sure would like to have one of those lathes," Fowler beamed when D. W. Blair escorted him through the Gravity Meter Shop where skilled machinists design and make all kinds of precision instruments. There gravity meters, magnetometers, clocks and watches are received from the field to be reworked.

The first engineer to pump crude oil out of the Ranger field, Fowler was especially interested in talking with R. C. Craze of the Production Research Division. Craze explained in some detail the Company's continuing search for better methods of analyzing the performance and behavior of oil reservoirs with the aim of improving future production practices.

When Raymond Woods of the Research Section of the Exploration Department showed him museum samples of cap rock materials that had been brought to the surface from salt domes during drilling operations, Fowler exclaimed: "Years ago, when I was a driller, we didn't have anywhere near the information you have today." Woods smiled and answered: "Yes, these rocks tell us a good deal about subsurface formations." The samples which make up this museum came from the Paleontology Laboratory which was established in 1920, the same year that Fowler began his career with Humble Pipe Line Company at Iowa Park.

One of Fowler's last stops was at Humble's Touring Service where Manager Walter Hill furnished him a set of marked maps and colorful literature on places to be visited along the way during his forthcoming four-week vacation trip to New York.

By the end of his busy day in the Houston office, Fowler had seen a lot of people at work on all kinds of jobs, and had gained a fuller understanding of how his own job and theirs ties into the overall picture. The distance between Houston and the Texas Panhandle somehow seemed just a little shorter.

DITCH-DIGGER

THERE was once a man who had three cats and only one hole in the fence. He cut two more holes. As he explained it, "When I say 'Scat,' I *mean* 'Scat.' " The same methodical fellow, if he ever had occasion to dig a ditch, would have been delighted with the machine shown here. A ponderous thing, it digs a continuous ditch — *chasm* might be a better word—**more than nine feet wide and about 20 feet deep!**

Only a portion of the king-sized machine is shown at work on this new storm sewer at Baytown Refinery. Most of its digging parts are hidden below the surface, gouging at the bottom of the ditch and chewing at its sides. The conveyor buckets in the center bring up loose earth almost as fast as trucks can carry it away.

The new storm sewer, which will share some of the heavy burden placed on Baytown Refinery's central system after hard rains, is a way of catching up with the growth and development of the plant. By reducing ponded waters after rains, it will help improve working conditions, will cut down on the number of delays and work stoppages, and will reduce possible hazards to safety.

Water carried by the new sewer will go first to No. 10 Separator, and will be directed from there into the Houston Ship Channel.

King-sized machine used on storm sewer job at Baytown Refinery digs a ditch nine feet wide, 20 feet deep. Below, concrete is poured as ditcher moves on.

Baytown

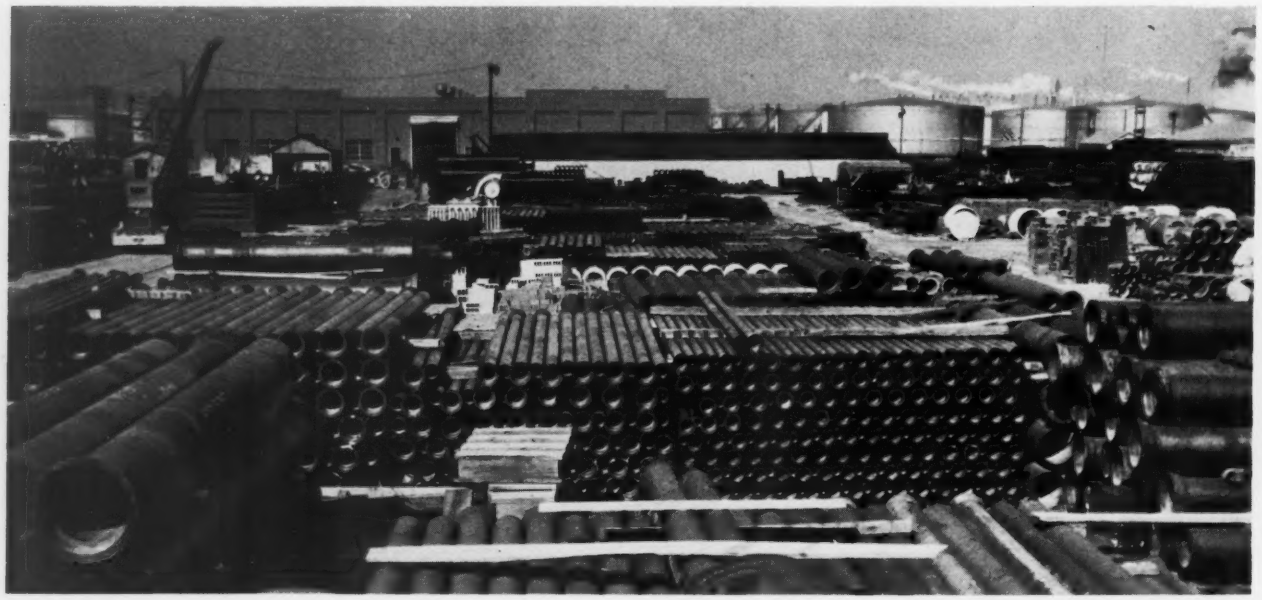
General Store

Refinery's mechanical nerve center makes on-time delivery of 600 orders daily for supplies and materials from cataloged 80,000-item stockpile

One of Baytown Refinery's important units seldom gets a second look from the average visitor. A long, low brick building which stands second from the San Jacinto Street entrance, it is distinguished in appearance only by its size. It looks exactly like what it is—a storehouse. But it is no ordinary storehouse; it is the mechanical nerve center from which flow the spare parts and pieces of equipment that keep Baytown Refinery going. Within its walls and in the yard behind are amassed 80 thousand *different* classifications of equipment, and there may be anywhere from one to thousands of pieces under each classification. The warehouse inventory of equipment needed to keep the Refinery running smoothly and efficiently is worth about $6 million.

Remarkable, too, is the fact that only 143 people are required to carry on this vast operation—a feat made possible by capable personnel and modern methods.

Timing of orders is the secret of the storehouse efficiency. The system devised to handle the 600-odd orders daily works smoothly on an exact schedule. Deliveries are made precisely two hours from the time the order is called in. Usually, if the delivery is only a minute late, the driver gets a good-natured joshing. Accurate timing is required both in the storehouse and in the field, for the craftsman who requests the material must be present when it is delivered. Emergency orders, of course, are expedited



A lot of pipe is needed to keep Baytown Refinery running. This is just part of the stock in the yard behind the storehouse; movement is made easier by using crane shown at upper left. A railroad track runs through middle of yard.

Catalogers have big job of replacing these 26 volumes, now being used, with one to be two-fifths the size of all.

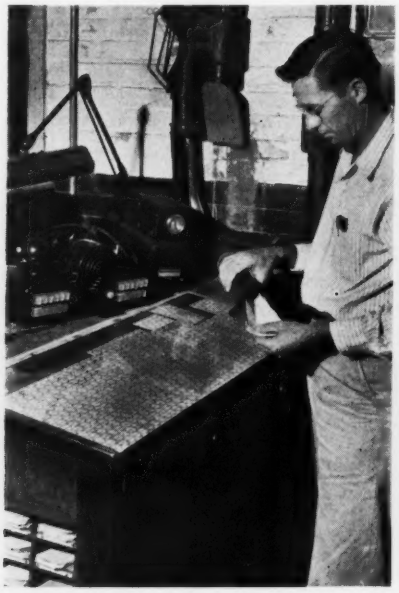
Accurate records of stock inventories are maintained by large staff of men and women in the storehouse office.

for immediate delivery whenever called for.

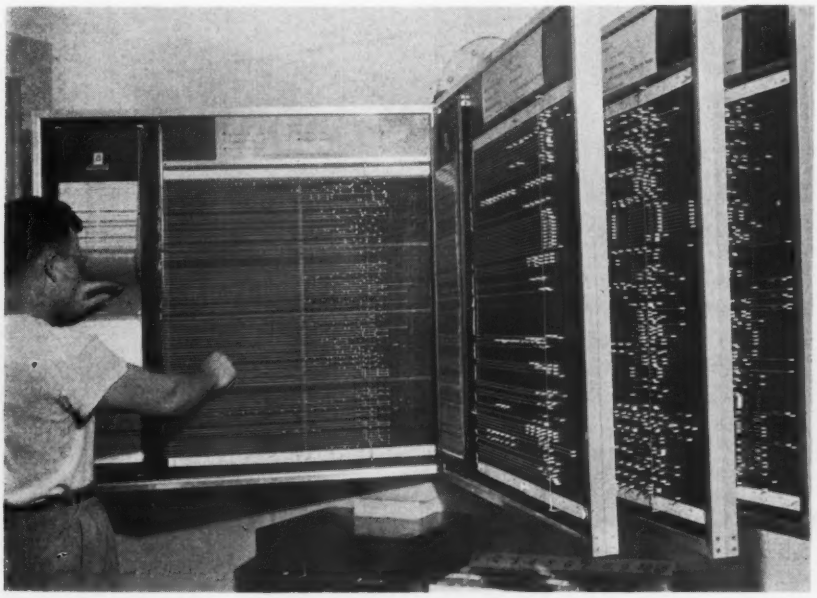
Baytown Refinery is a big place with many large units requiring a lot of complicated equipment. Like a human, it can develop aches and pains with little warning. At any given time, a particular unit may be humming; a moment later, it may be a sick patient requiring attention. So it isn't always possible to keep deliveries on perfect schedule, particularly when rush orders occasionally overtax facilities. But rushed or on routine schedule, storehouse personnel pride themselves in keeping stocks moving to the units that need them.

Judge for yourself the magnitude of storehouse activities. Material received monthly during 1948 by carload lots, less-than-carload lots, truck-line deliveries, air and air-express, and parcel post, amounted to a staggering total of 10 million pounds. Roughly, that is the equivalent of 91 box-car loads. And it must be remembered that some of these items are so tiny that thousands of them take up less space than a shoe box. The consumption rate is about the same as the material-received rate, too, because equipment does not linger at the storehouse. The storehouse is only a brief stopping point through which most of the equipment flows to points where it is needed. That explains the daily average of 500 to 600 deliveries throughout the Refinery; the 390,563 in-and-out transactions during 1948.

Standardization on certain types of materials simplifies stocking and permits interchangeability of repair parts. It has been found that in certain instances the same part may be used in as many as 40 different machines.



Pneumatic tubes and inter-communication system speed up handling of orders.



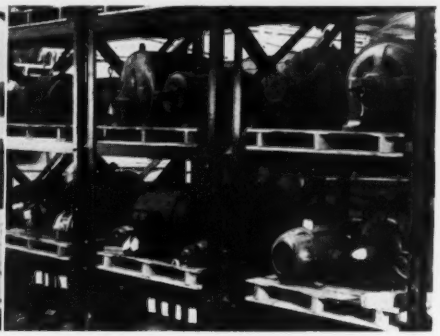
Control boards are another modern device used by the storehouse to keep accurate records of delivery dates for equipment. This operator is making his daily inspection.

Palletizing of materials gives storehouse four times as much storage space as before. Now equipment can be stacked neatly, located easily, and moved through spacious aisles.

Before palletizing, the storehouse looked like this. Equipment was

Rust-ban paint is stacked to rafters.

Roof tile is for Cracking Coil No. 3.



Electric motors are stored on pallets.

Baytown Refinery storehouse has a

These factors, plus the growing availability of materials, will make it possible to reduce the inventory substantially within the next few months and still maintain the same high efficiency.

A tour of the storehouse is much like a visit to an old-time general store where the merchant supplied bolts of bright-colored calico, packets of tangy spices, packages of coffee —all the staple items. Storehouse commodities, of course, include refining equipment, paints, construction materials — all sorts of items needed to keep a modern refinery going. But whereas the general store merchant might have had to rummage around a bit to find an item, storehouse personnel fill orders at a moment's notice, 24 hours a day. For refinery operations depend on careful and coordinated timing. Breakdowns of vital equipment, without prompt replacements, might lead to costly tie-ups.

Orderly maintenance of stocks, then, is a necessity. When the storehouse was built in 1930, it was designed to hold an inventory of $1 million. But look at it today, 19 years later—the same building now holds $6 million worth of equipment.

Back in 1930, a railroad track ran down the middle of the storehouse for its full length. This made it possible to unload and store heavy and bulky items, because the box cars could be moved reasonably close to the desired storage point. But as the inventory increased, congestion became acute. A system of palletizing was the answer to this problem. Pallets made of hard wood, 48 inches square, came into use as a means of transporting and storing materials. Unused air space above the materials formerly stored only on the floor is used, and four times as much space is available. These pallets are stacked by high-lift fork trucks.

stored only on the floor, was hard to handle, and took up too much space.

Tip screws: smallest item in stock.

Large bolts are being sacked for delivery to one of the Refinery's many big units.

as a vast array of parts and supplies

But what of the maintenance of such an immense supply of materials? Doesn't it require uncommon effort to locate desired items and to guard against stocks running low? Yes, it does, but storehouse personnel are trained for the job. It takes a year for a new employee to become even partially familiar with all the equipment locations. In an effort to simplify matters, a cataloging group is working on a new master catalog which, when completed, will be about two-fifths the size of the 26-volume catalog now in use.

How does a department order equipment from the storehouse? The operator in charge of one of the various units determines that a replacement part is needed. He makes up an order which is sent to the zone supervisor, who assigns the problem to the craftsmen who will perform the work. These craftsmen then order the material from the storehouse by 'phone. Two hours later the material is delivered.

But on a major job such as a "Cat Cracker" turnaround, for example, the problem is quite different. A turnaround means taking an entire unit out of service for a complete overhaul. These essential repairs must be made quickly and skillfully, because it is costly to have the unit out of production. Although only six men are required to operate a Cat Cracker, it takes several hundred men from the mechanical group to turn one around. A stock supervisor from the storehouse remains at the unit throughout the operation and personally coordinates the ordering of needed parts.

Important? Indeed that little-noticed building, second from the San Jacinto gate entrance, is important! For large or small, rushed or routine, *Baytown General Store* fills orders 24 hours a day for essential materials and supplies needed to keep the great Refinery operating at peak efficiency.

By the way...

Retirements

Fourteen employees of the Humble Companies have retired since the last issue of THE HUMBLE WAY. All but one have been with Humble for more than 20 years.

Pipe Line employees retiring are: KEITH F. DUTSON, assistant district gauger at Friendswood, on June 15 after more than 20 years service . . . RUFUS W. FRAZIER, line rider or walker at Hawley, on July 8 after 24 years service . . . JAMES B. HARVEY, tank superintendent of all tank farms, on July 1 after more than 30 years service . . . GILBERT C. ROSENTHAL, division engineer, operating field, on July 9 after 29 years service . . . and PAUL P. WALLACE, line rider or walker at London, on June 24 after almost 23 years service.

From the Production Department, CLELL N. COX, roustabout at Tomball, retired on July 2 after almost 25 years service . . . JOHN E. DAVIS, pumper and gauger at Goose Creek, on June 30 after 28 years service . . . CHARLES W. DELANCEY, superintendent of the Gulf Coast Division, on July 27 after 30 years service . . . and HENRY HAMMONTREE, pumper and gauger at London, on June 21 after 24 years service.

Two Baytown Refinery men have retired: JAMES L. DUNMAN, gang pusher, retired on July 16 after more than 31 years service . . . and WILLIAM E. SLOAN, pipefitter first class, on June 11 after almost 29 years service.

Retired Houston Office employees are: MRS. HATTIE R. CAMPELL, payroll clerk in the Treasury Department, on July 24 after 19 years service . . . MAY Q. GARTHAR, librarian in the Geological Department, on June 12 after 25 years service . . . and DOROTHY S. NORWOOD, clerk-stenographer in the Crude Oil Accounting Department, on July 22 after more than 23 years service.

Deaths

Nine active employees and one Humble annuitant have died since the last issue of THE HUMBLE WAY.

Employees who have died are: BARNEY COKER, 50, helper at Baytown Refinery, on June 1 . . . WILLIE L. COTTON, 31, lease pumper at Hobbs, on June 6 . . . ISAAC A. GEORGE, 40, porter at Corpus Christi, on July 18 . . . WESLEY D. HILL, 47, lease pumper and gauger at Pickton, on June 30 . . . JULIAN E. HOFFMAN, 48, stock gauger at Satsuma, on June 2 . . . WILLIAM L. KNOBLES, 60, pumper and gauger at Kelsey, on July 12 . . . DEWEY G. MCCORMACK, 50, pipe liner at Pierce Junction, on August 4 . . . FRANK V. MOORE, 59, compound supervisor at Baytown Refinery, on July 16 . . . and FLOYD C. SAXON, 53, boilermaker first class at Baytown Refinery, on August 4.

MRS. CARRIE B. MERRITT, 61, building maintenance janitress in the Houston Office before her retirement, died on June 27.

New Field Doctor

Dr. Bartis M. Kent, 24, who came with Humble on July 1 as a field medical examiner, will be in charge of the Company's mobile medical unit. He replaces Dr. James M. Horner, Jr., who resigned from the Company on June 30.

Dr. Kent

A native of Terrell, Texas, Doctor Kent received his premedical education at Southern Methodist University where he attended from June, 1943, through October, 1944. He received the degree of Doctor of Medicine from Baylor University College of Medicine on June 14, 1948, and completed a year of rotating internship at Jefferson Davis Hospital in Houston on June 30, 1949.

The HUMBLE WAY

Vol. V JULY-AUGUST No. 2
1949

Competition in Gasoline Marketing 1
What Goes on Below..... 4
Progress in Marketing.....10
Rig 30 Adds a "Sidetracker".....15
Inside a Cat Cracker.....18
Pipeliner Visits Houston Office...20
Ditch-Digger 23
Baytown General Store.....24
By the way.....28

Published every other month for employees and stockholders

HUMBLE OIL & REFINING COMPANY

P. O. BOX 2180, HOUSTON 1, TEXAS

BOARD OF DIRECTORS

L. T. BARROW, *Chairman*

HINES H. BAKER — REX G. BAKER
DAVID FRAME — H. W. FERGUSON
D. B. HARRIS — MORGAN J. DAVIS
J. A. NEATH — C. E. REISTLE, JR.

OFFICERS

HINES H. BAKER, *President*
L. T. BARROW, *Chairman*
DAVID FRAME, *Vice President*
D. B. HARRIS, *Vice President and Treasurer*
J. A. NEATH, *Vice President*
REX G. BAKER, *General Counsel*
GAY CARROLL, *Comptroller*
H. K. ARNOLD, *Secretary and Assistant Treasurer*
NELSON JONES, *General Attorney*

Permission for reproduction of articles and pictures contained herein will be granted freely if credit is given and the request is made of the Editor, THE HUMBLE WAY, P. O. BOX 2180, Houston 1, Texas.

Picture Credits: Inside covers, pages 9, 23-27, R. B. Jacobs; page 9, T. E. Nowlin; pages 16, 17, staff; pages 14, 15, Bob Bailey; all others, including back cover, by Staff Photographer Mel Coston.

Art Credits: Front cover, page 12, E. M. Schiwetz; pages 16, 18, Sauer Studio; back cover, Ruth Conerly; pages 5, 9, after *The Lamp*.

Palletized materials are handled easily and speedily with modern fork lift truck. (See "Baytown General Store," page 24)

How deep is an oil well . . . How long is a piece of string?

The *oil industry* is going deeper to find more oil for America's needs, to discover reserves of oil that will be available for long-range needs and for national emergencies.

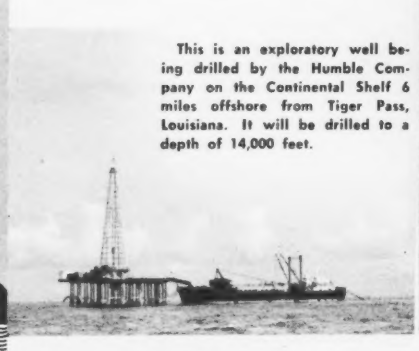
Fifteen years ago, the average depth of a Humble well was 4,362 feet. Ten years ago, the Company went an average of 700 feet deeper, to about 5,000 feet, to find oil. And the average depth of producing Humble wells drilled in 1948 was 6,695 feet.

That's average. Oil companies go a lot deeper if they think they can find oil farther down. The deepest well drilled in 1948 was 17,696 feet; it was a wildcat well which was a dry hole. In June of this year a well was being drilled *below 20,000 feet.*

How deep is an oil well? It's as deep as it has to be to find oil, or to prove that there's no oil there.

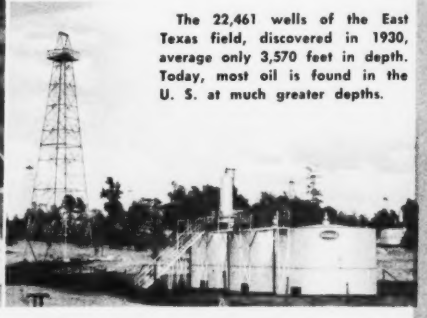
Costs go up as wells go deeper. A well 10,000 feet deep costs, on the average, about three times as much as a 7,000-foot well; a 15,000-foot well may cost 12 times as much.

But the oil industry continues to drill wherever its scientists think there is a possibility of finding oil; it will go as deep as equipment will permit in its hunt for oil . . . because it is a responsible, dynamic industry whose major interest is to supply the oil needs of today, and to provide reserves of oil for America's needs in the years to come.



This is an exploratory well being drilled by the Humble Company on the Continental Shelf 6 miles offshore from Tiger Pass, Louisiana. It will be drilled to a depth of 14,000 feet.

Humble has production from 12,026 feet from the discovery well in the South Mayes field in Chambers County, Texas.



The 22,461 wells of the East Texas field, discovered in 1930, average only 3,570 feet in depth. Today, most oil is found in the U. S. at much greater depths.

HUMBLE OIL & REFINING COMPANY